THE AMPHIBIANS AND REPTILES OF THE LEPINI MOUNTAINS (LATIUM, CENTRAL ITALY): CHECKLIST AND PROVISIONAL ATLAS*

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ABSTRACT

The checklist and a provisional atlas of the amphibian and reptile species occurring in the Lepini Mountains (Latium, central Italy) are reported. Eleven species of amphibians and seventeen species of reptiles have been found in the study area. These species represent 85% of the entire central Italian herpetofauna. One species (*Testudo hermanni*) seems to be recently extinct probably due to over-collecting and habitat perturbance, and at present occurs in semi-natural conditions only (specimens introduced by man). The dominant species are *Salamandrina terdigitata, Triturus carnifex, Triturus vulgaris, Bufo bufo, Rana italica, Rana* sinklepton *esculenta, Lacerta viridis, Podarcis muralis, Podarcis sicula, Chalcides chalcides, Hierophis viridiflavus,* and *Natrix natrix.* From the biogeographical point of view, the most interesting species are *Salamandrina terdigitata, Bombina variegata, Rana italica, Podarcis sicula, Chalcides chalcides, Elaphe quatuorlineata,* and *Coronella girondica.*

INTRODUCTION

The herpetological fauna of Latium, as well as the distribution of the amphibian and reptile species in this large region of central Italy are yet poorly known. Recent literature records on the subject are scarce (e.g., Capula and Bagnoli, 1983; Bagnoli, 1985; Carpaneto, 1986; Capula, 1989; Bonifazi and Carpaneto, 1990), and no atlas dealing with the herpetofauna of Latium has been so far published.

The present paper provides the checklist and a provisional atlas of the amphibians and reptiles found in the Lepini Mountains, a montane area located in the southwestern part of Latium (Fig. 1). The Lepini Mountains are characterized by peculiar bioclimatic, faunistic, and vegetational characteristics (see, e.g., Pratesi and Tassi, 1972; Franzini, 1982; Zerunian and Sciscione, 1984; Corsetti, 1990; Forlenza and Corsetti, 1990), and will become a regional natural park (Segre, 1974; Corsetti, 1979, 1983).

DESCRIPTION OF THE STUDY AREA

The Lepini Mountains are a Mesozoic Massif located 40 km SE of Rome, extending for about 40 km southwards, between the Pontina Plain and the Apennine chain (Roma, Latina and Frosinone province). These Mountains have a surface area of about 800 km^2 and culminate in Mount Semprevisa (1536 m.a.s.l.) (Zaccheo, 1989).

The geological substratum is mainly constituted of Cretaceous limestone, with marly limestone in the superficial layers (Segre, 1974). Surface watercourses are scarce and torrential; the most important ones, i.e. The Amaseno and Sacco creeks, mark respectively the southern and the northeastern boundaries of the study area (see Fig. 1).

The climate is a typical Mediterranean one, with mild rainy winters and dry, warm summers (Giacomini, 1958).

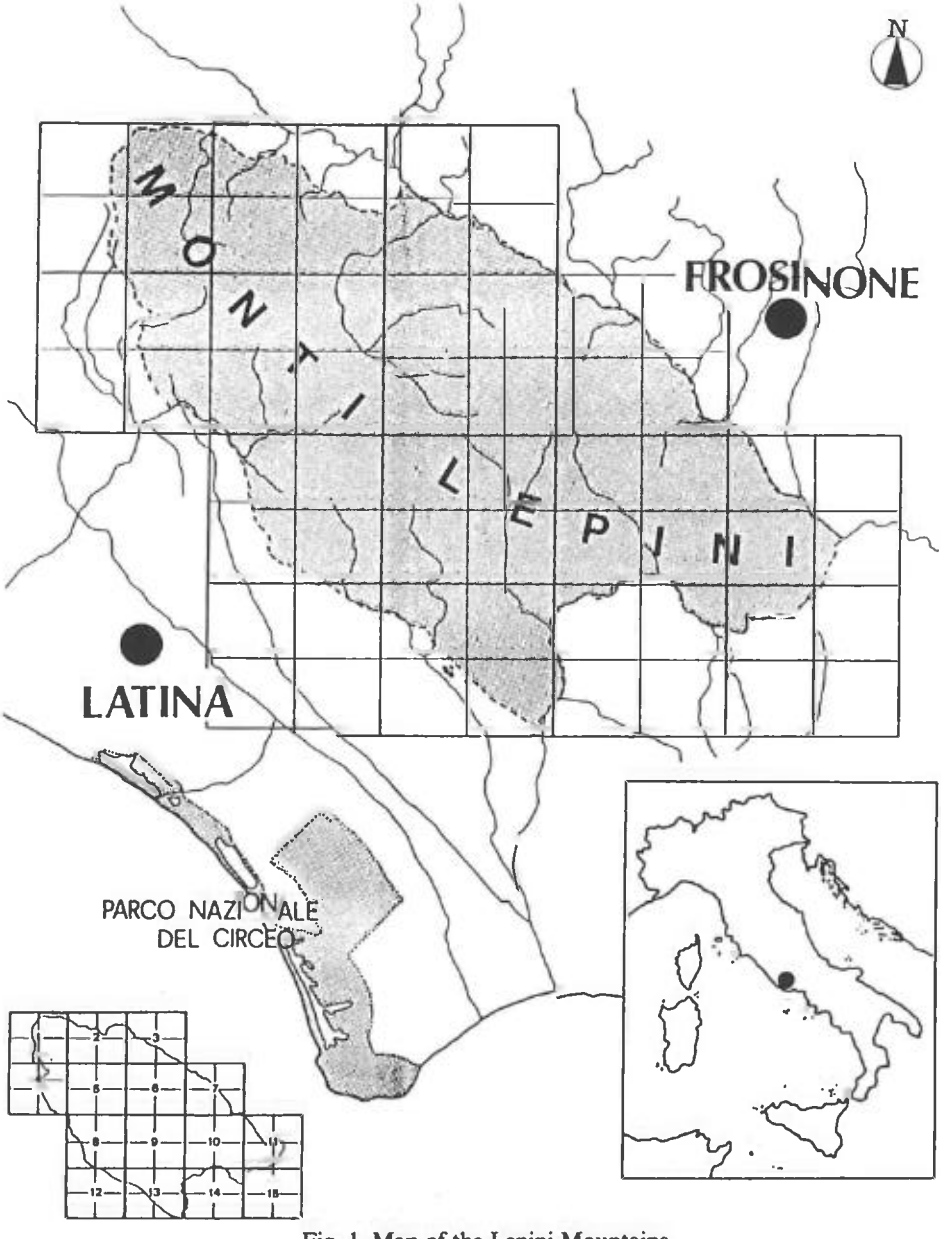

Fig. 1. Map of the Lepini Mountains

Between 200 and 500 m.a.s.l. the vegetation is mainly represented by the *Quercetalia ilicis* association, while between 600 and 1000 m.a.s.l. both the *Quercetalia pubescentis* and *Quercetalia roburi* associations occur, forming mixed wood. Above 1000 m.a.s.l. Beech wood (*Fagetalia silvaticae*) and montane pastures (resulting from deforestation) are present.

METHODS

The occurrence and distribution of each species in the study area was established by field investigations and from personal unpublished data. Field studies were carried out from 1982 to 1990 in the neighbourhood of the localities reported in Table 1. Amphibian and reptile

species were routinely searched for during the central part of the day (from 10.00 a.m. to 4.00 p.m.) in cool periods (spring and autumn), while during morning and crepusular hours (from 8.00 to 10.00 a.m., and from 5.0 to 9.00 p.m.) in summertime.

TABLE 1

Localities and codes of the 15 IGM maps utilized (for map localization see Fig. 1)

	Locality	1:25.000 IGM map
1	Artena	150 I SE
2	Colleferro	151 III SO
3	Anagni	151 III SE
4	Cori	158 I NE
5	Montelanico	159 IV NO
6	Carpineot Romano	159 IV NE
7	Supino	159 I NO
8	Sermoneta	159 IV SO
9	Roccagorga	159 IV SE
10	Giuliano di Roma	159 I SO
11	Ceccano	159 I SE
12	Sezze	159 III NO
13	Priverno	159 III NE
14	Roccasecca dei Volsci	159 I NO
15	Vallecorsa	159 I NE

Collecting was performed by hand or by dipnetting (e.g., in the case of species of the genera *Triturus* and *Rana*). The sex of each animal caught, together with its snout-vent length, were recorded. After collecting and checking sex, each animal was photographed and then released (all amphibian and reptile species except *Vipera aspis* are protected by a regional law in Latium).

Individual records were drawn separately for each species into 60 5x5 km squares, based on 1:25.000 IGM (Istituto Geografico Militare) cartographic system (see Fig. 1). Each square was filled out with a black circle in the case of one or more faunistic records in its area. Black circles of different size were used: a small circle (●) indicates one collecting locality; a medium circle (●) 2-4 collecting localities; a large circle (●) 5 or more collecting localities. For those species presently very rare (e.g., *Bombina variegata*) literature records before 1970 were also given. These records are indicated in the squares by an open circle (O).

RESULTS

The list of the Amphibians and Reptiles observed is reported in Table 2. The herpetofauna of the Lepini Mountains consists of 28 species, 11 of which are amphibians (3 urodeles, 8 anurans) and 17 reptiles (2 chelonia, 7 lizards, 8 snakes). These species represent the 85% of the entire central Italian herpetofauna.

TABLE 2
Species and locality records (locality numbers are according to Table 1)

Species	Locality
Salamandrina terdigitata	5, 6, 7, 8, 9, 10, 11
Triturus carnifex	5, 6, 7, 8, 9, 10, 13
Triturus vulgaris	5, 8, 10, 13
Bombina variegata	5, 6
Bufo bufo	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13
Bufo viridis	(literature record; locality not quoted)
Hyla arborea	4, 5, 6, 7, 8, 9, 10, 13
Rana dalmatina	7
Rana italica	1, 5, 6, 7, 8, 9, 10, 11, 13
Rana sinklepton *esculenta* (*Rana lessonae* + hybridogenetic *R. esculenta*)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13
Emys orbicularis	13
Testudo hermanni.	13 (probably extinct)
Hemidactylus turcicus	1, 2, 4, 8, 9, 13
Tarentola mauritanica	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Lacerta viridis	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Podarcis muralis	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Podarcis sicula	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Chalcides chalcides	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Anguis fragilis	5, 6, 7, 8, 9, 10
Hierophis viridiflavus	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Coronella austriaca	7, 8, 9, 11
Coronella girondica	8
Elaphe longissima	5, 6, 7, 8, 9, 10, 13
Elaphe quatuorlineata	4, 5, 6, 7, 8, 9, 10, 13
Natrix natrix	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Natrix tessellata	(literature record: "Amaseno River")
Vipera aspis	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13

Bufo viridis and *Natrix tessellata* were not found within the study area, but they are fairly common in the territories bordering the western and the southern part of the Lepini Mountains (e.g., the Pontina Plain and the Amaseno River) (Franzini, 1982; Capula, 1989). Therefore they were included in the list (Table 2), although not mapped.

Salamandra salamandra was never found during our investigations, but it must be stressed that this species has been quoted for the Lepini Mountains (without any locality specification) by Prates and Tassi (1972). Another species surprisingly not observed in the study area was *Triturus italicus*. Although occurring in the southern part of Latium, namely in two mountain systems close to the Lepini Mountains, i.e. the Ausoni and Aurunci Mountains (Lanza, 1983; Capula, 1989; Bonifazi and Carpaneto, 1990), this urodele was never encountered, and we think it is probably absent in the study area.

As shown in Fig. 2, *Salamandrina terdigitata, Triturus carnifex, Triturus vulgaris, Bufo bufo, Hyla arborea,* and *Rana italica* were widespread, occurring from low altitudes to the montane belt. The green frogs are represented by two coexisting forms (*Rana* sinklepton *esculenta*), i.e. the non-hybrid *Rana lessonae* and the hybridogenetic hybrid *Rana esculenta* (Uzzell et al., 1977; Uzzell and Hotz, 1979), which are also widespread.

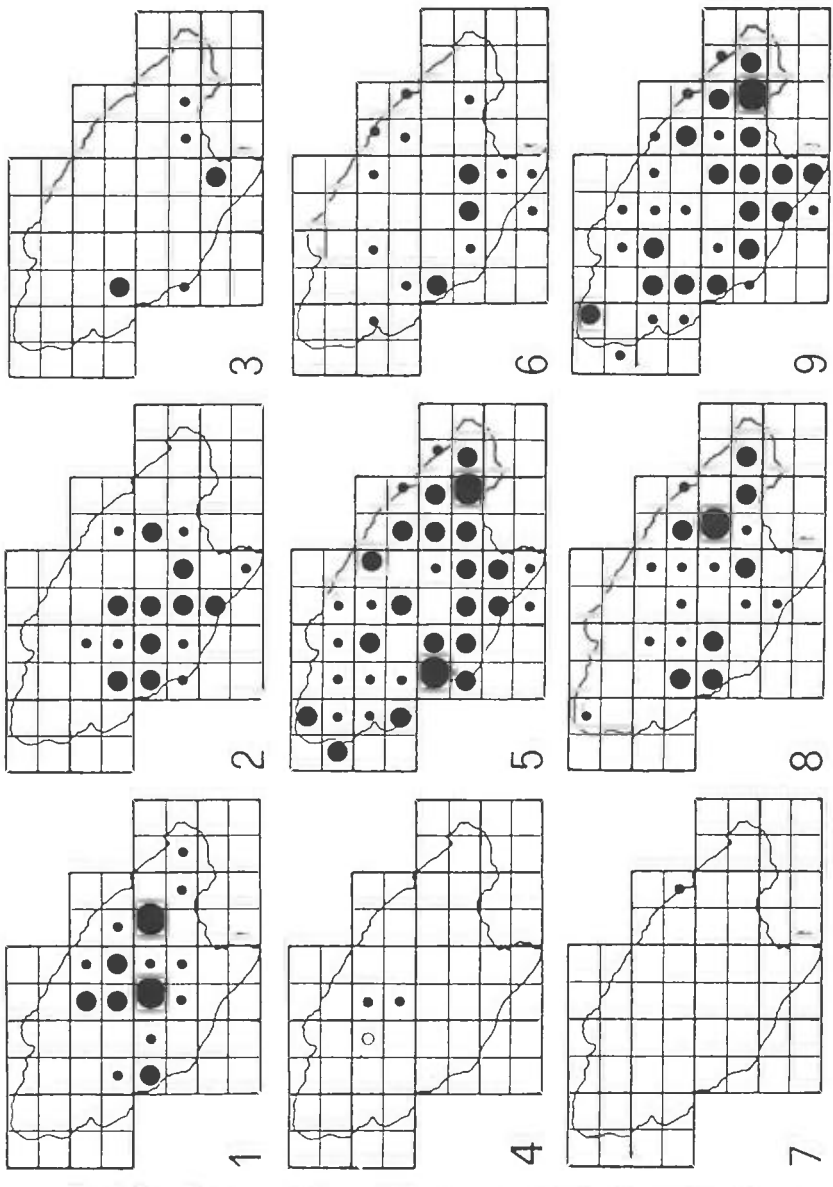

Fig. 2. Locality records of amphibians occurring in the Lepini Mountains.
1 = *Salamandrina terdigitata*; 2 = *Triturus carnifex*; 3 = *Triturus vulgaris*; 4 = *Bombina variegata*; 5 = *Bufo bufo*; 6 = *Hyla arborea*; 7 = *Rana dalmatina*; 8 = *Rana italica*; 9 = *Rana* sinklepton *esculenta* (*Rana lessonae* + *hybridogenetic Rana esculenta*).

Salamandrina terdigitata was shown to have rich populations in the Lepini Mountains, particularly when compared to those from the adjacent areas of Latium (Capula, 1989) (Fig. 3). This species was found in 32 localities of the study area, and in some of these it was observed laying eggs during winter (December and January) (Capula and Corsetti, in preparation). On the other hand, *Bombina variegata* and *Rana dalmatina* were observed in a few localities only, appearing to be very localized. This is possibly due both to the scarcity of suitable reproduction habitats (e.g., swampy broad-leaved woods), and to habitat disturbance related to human activity (water pollution, fire, agricultural activity, etc.).

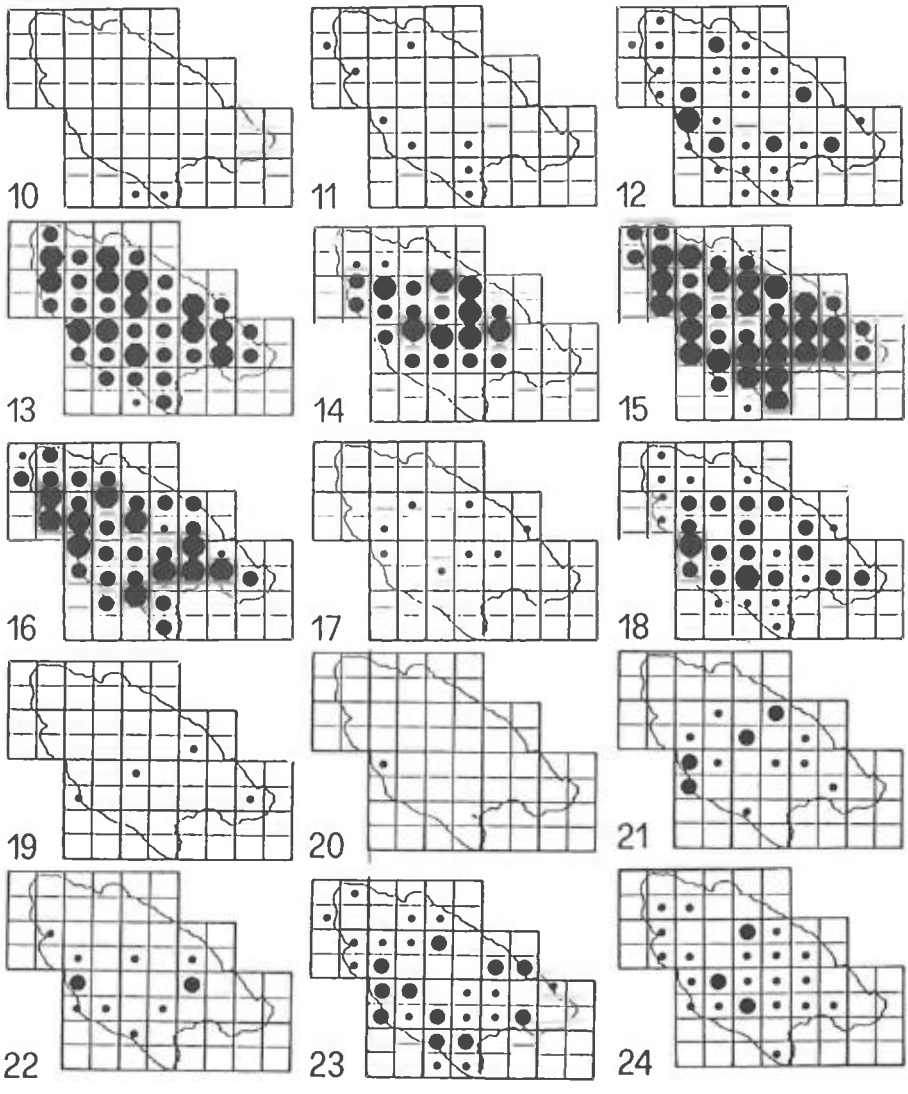

Fig. 4. Locality records of reptiles occurring in the Lepini Mountains.
10 = *Emys orbicularis;* 11 = *Hemidactylus turcicus;* 12 = *Tarentola mauritanica;* 13 = *Lacerta viridis;* 14 = *Podarcis muralis;* 15 = *Podarcis sicula;* 16 = *Chalcides chalcides;* 17 = *Anguis fragilis;* 18 = *Hierophis viridiflavus;* 19 = Coronella austriaca; 20 = *Elaphe longissima;* 22 = *Elaphe quatuorlineata;* 23 = *Natrix natrix;* 24 = *Vipera aspis.*

Among reptiles, *Tarentola mauritanica, Lacerta viridis, Podarcis muralis, Podarcis sicula, Chalcides chalcides, Hierophis viridiflavus, Narix natrix* and *Vipera aspis* were fairly common (Fig. 4). *Hemidactylus turcicus, Anguis fragilis, Elaphe longissima* and *Elaphe quatuorlineata* were also common, but rather localized. *Hemidactylus turcicus* was observed in the vicinities of human buildings only, while *Tarentola mauritanica* was found in different habitats, either on buildings and delapidated walls or in rocky areas.

Elaphe quatuorlineata occurred almost exclusively in dry and sunny *Quercus ilex* woodlands, smooth slopes with *Cytisus scoparius*, and semi-cultivated areas with olive groves, while *Elaphe longissima* was encountered either in fresh and wet woodlands or in dry and sunny rocky areas (e.g., old ruins, smooth slopes with *Cytisus scoparius*).

Emys orbicularis, Coronella austriaca and *Coronella girondica* seemed to be uncommon and very localized (e.g., one specimen only of *Coronella girondica* was observed during 8 years of investigation). The latter species appears to be rare and very localized also in most of central Italy (Capula, 1989; Luiselli and Rugiero, 1990). Their scarcity could be due to the lack of suitable environmental conditions, but we can not exclude an insufficient sampling.

As for *Testudo hermanni*, it seems to no longer occur in the study area. This species was known from a single site located in the southwestern part of the area, about 200 m a.s.l., but since 1975 it has not been observed. Over-collecting and habitat disturbance could have been responsible for its rapid decline. Although some specimens (introduced by man) were observed by us in semi-domestic conditions, it must be considered to be probably extinct.

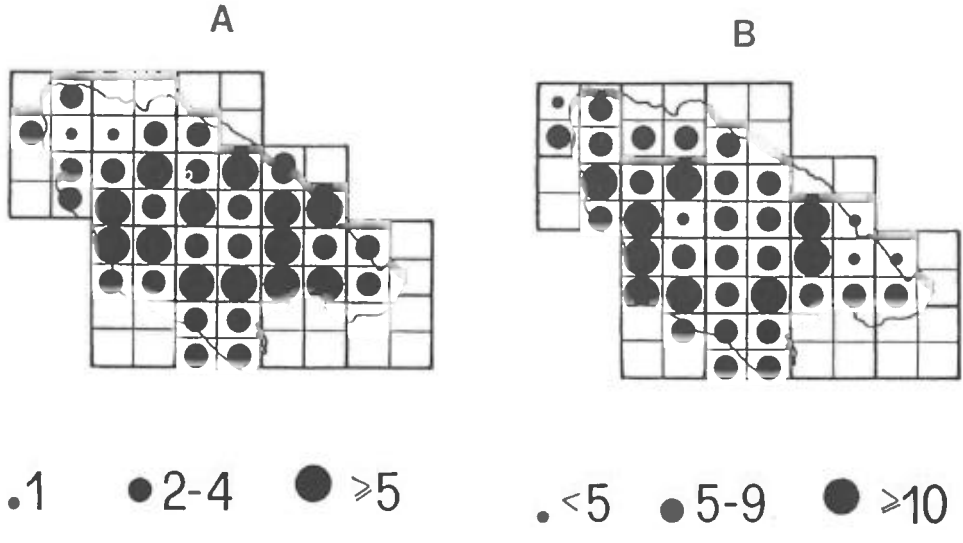

Fig. 6. Relative abundance of amphibians (A) and reptiles (B) in the Lepini Mountains. Each of the 60 5x5 km squares is filled out with a black circle whose size indicates the number of collecting sites.

DISCUSSION

The amphibians and reptiles occurring in the study area can be assigned to four main biogeographic categories, acording to La Greca (1964) (Table 3). The analysis of these categories shows that the herpetological assemblage of the Lepini Mountains is largely characterized by European species (60.7%), i.e. those species of Pleistocene immigration, and Mediterranean species (Holomediterranean and Apennine) (21.4%), i.e. thermophilous and endemic Italian species. The most interesting amphibians and reptiles, from a biogeographic point of view, are *Salamandrina terdigitata, Bombina variegata, Rana italica, Podarcis sicula, Chalcides chalcides, Elaphe quatuorlineata* and *Coronella girondica*.

TABLE 3
Chorological categories of the amphibians and reptiles occurring in the Lepini Mountains (chorological categories are according to La Greca, 1964)

Eurocentralasiatic species	*Bufo bufo, Bufo viridis,* *Hyla arborea, Natrix natrix,* *Natrix tessellata*
European species	*Triturus carnifex, Triturus vulgaris,* *Bombina variegata, Rana dalmatina,* *Rana* sinklepton *esculenta,* *Emys orbicularis, Testudo hermanni,* *Podarcis muralis, Lacerta viridis,* *Anguis fragilis, Hierophis viridiflavus,* *Coronella austriaca, Coronella girondica,* *Elaphe longissima, Elaphe quatuorlineata,* *Vipera aspis*
Holomediterranean species	*Salamandrina terdigitata,* *Rana italica, Podarcis sicula,* *Chalcides chalcides*

Salamandrina terdigitata is the only species of a genus endemic to the Apennines, and it can be retained as a paleoendemism. This species seldom occurs above 900 m a.s.l., and it can be considered as the most thermophilous Italian urodele (Lanza and Poggesi, 1971).

Rana italica is another amphibian endemic to the Apennines. It was originally described by Dubois (1987) as a subspecies of *Rana graeca* (*Rana graeca italica*), but Picariello et al. (1990) and Capula (1991) have recently demonstrated that it must be considered as a full independent species.

The analysis of environmental factors influencing the diversity of the herpetofauna indicates that in the cases of both classes the heterogeneity of environments (e.g., the presence of flat areas, hill systems, mountain peaks, etc.), as well as the occurrence of different vegetational zones (Mediterranean evergreen scrub, deciduous woodland, relict Beech forest, pastures) are the main causes both for the distribution and richness of species (Fig. 6). These factors, together with the favourable geographical position within the Italian peninsula, allow the coexistence of both thermophilous (Holomediterranean and Apennine) and orophilic (European and Eurocentralasiatic) amphibian and reptile species, making this part of Latium one of the most important as far as the herpetofauna is concerned.

Apart from *Triturus alpestris, Rana temporaria* and *Vipera ursinii*, i.e. species which are known to occur only in a few localities in the central Apennines (Capula and Bagnoli, 1983; Capula, 1989; Capula and Luiselli, in press), most of the amphibian and reptile species up to now recorded from Latium have been found in the study area. This indicates that the Lepini Mountains constitute a region of high herpetological interest. The identification of critical habitats in this area of Latium is therefore urgently needed, and the creation of a regional natural park is highly recommended.

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REFERENCES

Bagnoli, C. (1985). Anfibi e Rettili della provincia di Roma. Roma, *Provincia di Roma, Ass. Sanitá e Ambiente, WWF Lazio.*

Bonifazi, A. & Carpaneto, G.M. (1990). Indagine preliminare sugli anfibi e sui rettili dei Monti Ausoni-Aurunci (Lazio meridionale). Roma, *Centro reg. Doc. Beni Cult. Amb. Lazio, Ass. Cultura, Reg. Lazio,* 1-47.

Capula, M. (1989). V. Anfibi e Rettili. In: Piano pluriennale regionale per la tutela e la difesa della fauna autoctona in via di estinzione (L.R. 48/82): 1-94, Roma, *Regione Lazio, Ass. Agricoltura, Dipartimento di Biologia Animale e dell'Uomo, Univ. La Sapienza.*

Capula, M. & Bagnoli, C. (1983). Il *Triturus alpestris* (Laurenti) e la *Rana temporaria* Linnaeus nell'Appennino centrale (Amphibia). *Boll. Mus. Civ. St. nat. Verona,* **9** (1982): 333-334.

Capula, M. & Luiselli, L. Distribution and conservation of *Vipera ursinii* (Reptilia: Viperidae) in Italy. *Proc. VI Ord. Gen. Meeting S.E.H.,* in press.

Carpaneto, G.M. (1986). Osservazioni preliminari sugli anfibi e sui rettili del Parco Nazionale del Circeo (Amphibia et Reptilia). *Atti Conv. Asp. Faun. Probl. Zool. P. N. Circeo,* Sabaudia: 145-155.

Corsetti, L. (1979). Appunti per una proposta di Parco Naturale dei Monti Lepini. *Boll. Italia Nostra,* Roma, **20** (176): 12-14.

Corsetti, L. (1983). La fauna. In: Carta di Monte Cacume, Coopsit, Patrica, *Comune di Patrica.*

Corsetti, L. (1990). Atlante ornitologico dei Monti Lepini. *Ypothekai, Boll. Cons. Bibl. Monti Lepini,* **5** (1989): 3-221.

Dubois, A. (1987). Notes sur les grenouilles brunes (Groupe de *Rana temporaria* Linné, 1758). IV. Note préliminaire sur *Rana graeca* Boulenger, 1891. *Alytes,* **4** (4)(1985): 135-138.

Forlenza, G. & Corsetti, L. (1990). Orchidee spontanee del Monte Cacume. Patrica, *Quaderno 1, Comune di Patrica e Museo di Storia Naturale.*

Franzini, G. (1982). Gli anfibi e i rettili del Comprensorio dei Monti Lepini. In: Contributi alla conoscenza della fauna dei Monti lepini e qualche prposta di intervento, Coop. Ecol. Anim. Appl., 50-78, Priverno, *Regione Lazio, XIII Comunitá Montana.*

Giacomini, V. (1958). Conosci l'Italia. III. La flora. Milano, *Touring Club Italiano.*

La Creca, M. (1964). Le categorie corologiche degli elementi faunistici italiani. *Atti Accad. naz. ital. Ent.,* **11**: 231-253

Lanza, B. (1983). Guide per il riconoscimento delle specie animali delle acque interne italiane. 27. Anfibi, Rettili (Amphibia, Reptilia). Roma, *C.N.R.*

Lanza, B. & Poggesi, M. (1971). Gli Anfibi e i Rettili delle Alpi Apuane. *Lavori Soc. ital. Biogeogr.* (n.s.), **1** (1970): 624-666.

Luiselli, L. & Rugiero, L. (1990). On habitat selection and phenology in six species of snakes in Canale Monterano (Tolfa Mountains, Latium, Italy) including data on reproduction and feeding in *Vipera aspis francisciredi* (Squamata: Viperidae). Herpetozoa, **2** (3/4): 107-115.

Picariello, O., Scillitani, G. & Cretella, M. (1990). Electrophoretic data supporting the specific rank of the frog *Rana graeca italica* Dubois, 1985. *Amphibia-Reptilia, 11: 189-192.*

Pratesi, F. & Tassi, F. (1972). Guida alla natura del Lazio e dell'Abruzzo. Milano, Mondadori.

Segre, A.G. (1974). I Monti Lepini. In: Una Parco Natuale nei Monti Lepini (AA.VV. eds.), 5-8, Latina, *Italia Nostra, Cons. Serv. Cutl.*

Uzzell, T., Günther, R. & Berer, L. (1977). *Rana ridibunda* and *Rana esculenta*: a leaky hybridogenetic system (Amphibia Salientia). *Proc. Acad. nat. Sci. Philadelphia,* **128** (9): 147-171.

Uzzell, T. & Holtz, H. (1979). Electrophoretic and morphological evidence for two forms of green frogs (*Rana esculenta* complex) in peninsular Italy (Amphibia, Salientia). Mitt. Zool. Mus. Berlin, **55** (1): 13-27.

Zaccheo, L. (1989). I Monti Lepini. Roma, Newton Compton.

Zerunian, S. & Sciscione, L. (1984). Primi dati sulla riproduzione e lo sviluppo larvale di *Salamandrina terdigitata* (Lacépède) nei Monti leipini (Amphibia, Salamandridae). *Boll. Zool.,* **51** (suppl.): 117.